

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of: Kohmura et al.

Group Art Unit: 1796

Application No. : 11/526,688

Examiner: Margaret G. Moore

Filed: September 8, 2003 (PCT)

For: METHOD FOR MODIFYING POROUS FILM, MODIFIED POROUS FILM AND
USE THEREOF

DECLARATION UNDER 37 C.F.R. §1.132

Sir:

I, Kazuo Kohmura, a citizen of Japan, hereby declare and state that:

1. I graduated from Department of Chemistry, Graduate School of Science, Yamaguchi University with a Master's Degree in Science on March 31, 1993;
2. I joined Mitsui Chemicals, Inc. on April 1, 1993, and since that time have been engaged in the research and development in the Business Planning, Development & Administration Division in the Advanced Chemicals Business Sector, and in the Product Development Laboratory 2U in the Development Center;
3. I am a co-inventor of the invention disclosed and claimed in the above-identified patent application; and
4. I am familiar with the Office Action dated April 14, 2009, and understand the Examiner's rejections therein.

In order to demonstrate the difference between the structure of the modified porous film of the present invention and the structure disclosed in Weidman et al. (US 6,806,203), the following experimental results are reported herewith.

EXPERIMENTAL RESULTS

Measurement conditions of film thickness

Date: October 30, 2002

Apparatus: Stylus surface profiler, DEKTAK 3030®, manufactured by ULVAC, Inc.

Experimental Result 1

A coating solution was obtained in accordance with the method described in Example 2 of the

present specification. A porous film was obtained from the coating solution in accordance with the method described in Example 1. The thickness of the obtained porous film as measured was 0.20 μm . Then, this porous film was subjected to a modification treatment in accordance with the method as described in Example 1. The thickness of the porous film after being subjected to the modification treatment for 0.5 min., 1.0 min. and 90.0 min. was measured, respectively, and the result obtained in each measurement was 0.19 μm . The measurement value was rounded to the hundredth for measurement accuracy. The cause of reduction in the thickness of the porous film after the modification is considered to be measurement deviation or the contraction of the porous film due to heating.

Experimental Result 2

A porous film was obtained and was subjected to a modification treatment in accordance with the method described in Experimental Result 1, except that the modification treatment was conducted at a temperature of 400 °C, rather than 250 °C (Example 15). The thickness of the modified porous film after being subjected to the modification treatment for 90.0 min. as measured in accordance with the method described in Experimental Result 1 was 0.19 μm .

CONCLUSION

As shown in the above Experimental Results 1 and 2, the modified porous film obtained in the method of the present invention maintains a substantially monolayer structure even after the modification treatment. Therefore, the modification treatment of the present invention is conducted such that an outer surface of the porous film and an inside surface of a pore of the porous film are brought into contact with an organic silicon compound, but a layer of the organic silicon compound is formed on the porous film.

On the other hand, the plasma treatment using TMCTS as a silica source described in Weidman et al. forms a hard mask layer 122 on a mesoporous silica layer 166. This layer 122 is generally a nonporous, silicon-containing film (column 8, lines 17 to 18), and is provided in order to protect layer 116 (column 9, lines 44 to 46).

It is thus clear that the method of the present invention provides a modified porous film having a different structure from that of the double-layer structure of Weidman et al.

I further declare that all statements made herein of my own knowledge are true and that all statements made based on information and belief are believed to be true, and further, that

these statements were made with the knowledge that willful false statements and like so made are punishable by fine or imprisonment, or both, under section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

DATE: July 15, 2009

Kazuo Kohmura
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